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PATENT ABSTRACTS OF JAPAN

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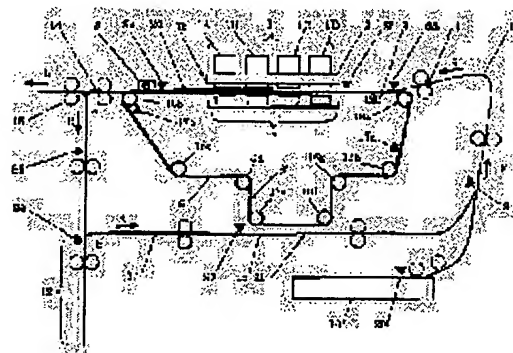
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(54) INK JET RECORDING APPARATUS

(57)Abstract:

PROBLEM TO BE SOLVED: To solve the problem that cleaning and maintenance cannot be easily conducted in a short time during a sequence of image formation operations because the image formation is carried out when a recording paper being held by a transfer means is moved under a recording head in a state in which the recording head is fixed.

SOLUTION: An opening part 6' is set to part of the transfer belt 6 for transferring the recording paper 20 disposed to a position opposite to the recording head 1, via which the whole recording head is handled. A wiper blade 7a and a capping member 7b having a cleaning/maintenance function and set to below the transfer belt 6 oppositely to the recording head can be directly driven via the transfer belt opening part 6'. In the constitution, the transfer belt 6 is a charged belt which can electrostatically adhere and transfer the recording paper. Moreover, since the transfer belt is constituted of an endless belt, the belt is controlled in one direction of a transfer direction without reversion, which is more effective to shorten a time other than for the image formation.



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CLAIMS

[Claim(s)]

[Claim 1] An ink jet recording device which prepared a opening for receiving cleaning / maintenance means in a location which meets said recording head at a conveyance means of said recording paper in an ink jet recording device which records an image on the recording paper conveyed in a location which is made to carry out regurgitation flight of the ink from a recording head, and meets said recording head.

[Claim 2] An ink jet recording device according to claim 1 with which cleaning / maintenance means arranged at the opening subordinate section of said conveyance means is characterized by being a wiper blade and capping.

[Claim 3] An ink jet recording device according to claim 1 characterized by being the electrification belt with which said conveyance means can carry out adhesion conveyance of the recording paper electrostatic.

[Claim 4] An ink jet recording device according to claim 3 characterized by said electrification belt being an endless belt

[Claim 5] An ink jet recording device according to claim 1 characterized by installing another member which equipped said opening with a mark function in which positional information of reinforcement and a conveyance means is detectable.

[Claim 6] An ink jet recording device according to claim 1 characterized by preparing said recording head in a predetermined gap with a full multi-type line arm head.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the ink jet recording device which can be performed easily, without avoiding a form conveyance means in maintenance actuation of sealing (capping) of the compulsive regurgitation (Flushing) / ink regurgitation side of the cleaning and ink of the ink regurgitation side of a stationary type line arm head etc.

[0002]

[Description of the Prior Art] The ink jet recording device is constituted so that regurgitation flight of the ink is carried out, and the recording paper may be adhered / fixed and it may record on it from the delivery of a recording head. Therefore, a good image will be obtained by keeping good regurgitation flight of the ink from a detailed delivery, and consideration of a delivery becomes important.

[0003] Since the poor ink regurgitation by adhesion in the delivery side of an ink drop, or a paper powder and a foreign matter by the rebound phenomenon from the recording paper under record arises as consideration, the affix of a delivery and near is wiped off by rubber members (wiper blade etc.). Apart from actuation of image recording, there is blowing away an affix from a delivery using the surface tension of discharge and ink liquid etc. about ink in fields other than the recording paper.

[0004] Moreover, since the front face of the ink meniscus near the delivery will dry and the poor ink regurgitation will arise if the regurgitation side is left in the condition that there is no ink regurgitation over a long period of time, the maintenance means which covers / seals the whole delivery with a bonnet and the open air by the rubber member is used.

[0005] Especially a recording head is carried in carriage, a wiper blade and a capping member are arranged at the portion outside a record section (it is a home position with many equipments) in the serial mold ink jet equipment which carries out image formation in serial actuation, and cleaning/maintenance is performed if needed as extension of carriage round trip actuation of image formation.

[0006]

[Problem(s) to be Solved by the Invention] There is the following trouble of a proper in cleaning/maintenance actuation of the recording head of the line type ink jet equipment with which that to which cleaning/maintenance actuation was performed in serial round trip actuation of a recording head has arranged the full multi-type stationary type recording head in serial mold ink jet equipment.

[0007] (1) Since the recording paper moves in the state of immobilization and image formation of the recording head is carried out, cleaning/maintenance cannot be easily performed in actuation of an image formation single string. It is necessary to move independently the one of the two unit of a recording head or cleaning/maintenance means greatly.

[0008] (2) Since it is necessary to perform cleaning of Flushing etc. in an image formation process and image formation is interrupted to whenever [the], compaction of image formation time amount is difficult.

[0009] The object of this invention is to offer the ink jet recording device which can perform cleaning/maintenance service of the regurgitation side of a recording head in a short time in the flow of image formation also in the ink jet recording device of said line method.

[0010]

[Means for Solving the Problem] In order to attain said main object, it considers as a configuration which prepares a opening which can mind the whole recording head in some conveyance belts which convey the recording paper arranged in a location where an ink-jet recording device of this invention meets a recording head, and a wiper blade and a capping member which have cleaning/maintenance function prepared by confrontation of a recording head at the

lower part of a conveyance belt enable it to operate directly through a conveyance belt opening.

[0011] In the above-mentioned configuration, since it is the electrification belt which can carry out adhesion conveyance of the recording paper electrostatic, and the conveyance direction serves as unidirectional control action by constituting from an endless belt and a conveyance belt does not have reversal actuation, it is effective by time amount compaction of those other than image formation.

[0012]

[Embodiment of the Invention] Hereafter, the example of this invention is explained based on a drawing.

[0013] Drawing 1 is drawing showing the typical configuration which shows one example of the ink jet recording device of this invention, and drawing 2 is the typical block diagram showing the time of maintenance member operation. Moreover, drawing 3 is the typical block diagram of conveyance belt opening which, 'twisted and drawing 2 looked at. [arrow head] In this example, it is the case of multicolor record (four colors) of a color.

[0014] In drawing 1 or drawing 3 , 1 is the recording head section, is constituted by two or more recording head units 1A, 1B, 1C, and 1D which have the length covering full [of the cross direction of the recording paper 20], and is being fixed to one by the head adapter plate 2. In this example, each recording head units 1A, 1B, 1C, and 1D carry out the regurgitation of the ink of a color different, respectively. moreover, the line arm head on which a predetermined number does not illustrate further each recording head units 1A-1D of this example -- predetermined gap parallel -- predetermined -- it consists of forms which shifted resolution and is fixed.

[0015] In this example, the resolution in one line arm head considers said line arm head as the configuration of four shifted to parallel zigzag at an equivalent for 720DPI, and formed the resolution of 720DPI in 180DPI (dot per inch) at the time of the image formation in each head unit. Said line arm head is energized to electric-machine sensing element, changes the volume of ink passage, and carries out discharge image recording of the ink from an ink regurgitation side.

[0016] The resist roller which adjusts the recording paper with which 3 was conveyed in the direction of arrow head F through feeding/conveyance way 11 in drawing 1 from the medium tray 10 by which the recording paper 20 is contained, and 4 The electrification machine for carrying out adsorption maintenance of the recording paper conveyed from said resist roller in static electricity on a conveyance means and 5 The electric discharge machine for making the recording paper by which adsorption conveyance has been carried out on a conveyance means exfoliate / convey in an arrow head H and the direction of R from a conveyance means, and 6 Establishing a means to hold the recording paper 20 in static electricity on a belt front face, and conveying the recording paper along a conveyance way A conveyance belt (conveyance means) for gap etc. not to produce the image location formed in each recording head unit and 7 The service station section equipped with capping unit 7b which performs actuation which prevents the receiving part of the regurgitation ink at the time of wiper-blade 7a which cleans the ink regurgitation side of each recording head unit, and ink flushing, and desiccation of ink is shown, respectively.

[0017] As a flow of the recording paper 20 in this example, the recording paper from a medium tray 10 Where it has consistency with the resist roller 3, while it is sent to a conveyance belt and adsorption maintenance is carried out in static electricity, sequential formation of each color image is carried out in each recording head unit. After exfoliation actuation from a conveyance belt is performed by the electric discharge machine 5, it is discharged in the direction of arrow head H by degree strokes (a cutter/paper output tray) which are not illustrated with the conveyance roller 14 and the delivery roller 15. In this example, the mode change of re-conveyance to rear-face image formation is also considering that in which one side carried out image formation as the possible configuration using the reversal means established near the blowdown path. A conveyance path is changed, illustrated, twisted and changed between said conveyance rollers 14 and delivery rollers 15, gating a is prepared, and the conveyance path of rear-face image formation is conveyed in the direction of arrow head R through there, and is primarily stored in the reversal way 12. a conveyance path is changed near said reversal way 12 -- it does not illustrate -- it changes and gating b is prepared, the roller which can be conveyed to positive hard flow is arranged, the recording paper after reversal actuation and storing is changed, and the recording paper is conveyed in the state of reversal in the direction of arrow head R' through gating b on a reversal way. The conveyance roller which has the function which transmits actuation of the recording paper to the conveyance way 13 conveyed in the state of reversal, and adjusts the skew of the recording paper is arranged.

[0018] In the recording paper conveyance path constituted as mentioned above, the sensors S1-Sn possessing the function to detect the recording paper at each conveyance section are arranged, and actuation is performed also as that of optimum control so that a recording paper gap may serve as min by the control section which does not illustrate the recording paper 20 using the passage detection information on the conveyance condition in a conveyance belt, and the recording paper.

[0019] The conveyance belt 6 which conveys the recording paper 20 under the recording head unit in this example is arranged in the condition of being twisted around the roller members 16a-16h, as shown in drawing 1 , and adsorption

maintenance of the conveyance under a recording head unit is carried out on the upper surface of the conveyance belt 6 supported by the roller members 16a and 16b, and it is conveyed. The revolution transfer of the actuation by the driving gear which does not illustrate the actuation at the time of conveyance in this example is carried out through roller member 16a. Therefore, the roller members 16, 16b, 16c, and 16h have composition which can carry out independent movable immobilization as conveyance belt tension adjustment which other roller members 16b-16h are the configurations of a follower-roller, and contributes at rectilinear-propagation stability mostly in order to secure the rectilinear-propagation stability of the conveyance belt 6. Moreover, in this example, the sensors 17a and 17b for detecting the conveyance location of a conveyance belt to the roller member side of the conveyance belt 6 have been arranged.

[0020] In order to carry out adsorption maintenance like aforementioned static electricity, the electrification machine 4 is arranged at the rear face of the conveyance belt 6 near the roller member 16a, and he impresses direct-current bias, and is trying to make uniform electrification perform to a conveyance belt. Moreover, about exfoliation conveyance of the recording paper 20 after image formation, the electric discharge machine 5 for removing the charge impressed with the electrification vessel 4 near the roller member 16b used as branching with degree stroke (electric discharge) is arranged, and it is considering as the configuration which carries out exfoliation conveyance of the recording paper held in static electricity from the conveyance belt 6. Usually, although exfoliation claw part material etc. is used near the electric discharge machine as a trigger of the exfoliation actuation after said electric discharge, the recording paper is made to exfoliate by this example in the belt arrangement location of the radius of curvature of roller member 16b, and a conveyance belt, and the nerve of the recording paper.

[0021] Recording paper conveyance with the conveyance belt 6 will be performed by static electricity-aforementioned electrification and the electric discharge to a conveyance belt being repeated by turns. Therefore, the property which is good electrical characteristics that a dielectric constant is high is required of the conveyance belt 6 by electrification/electric discharge. Moreover, in addition to this, mechanical properties, like creep resistance and process tolerance are high will be required. In this example, the conveyance belt 6 also added the property which is a transparent member, in order for a transparency mold photosensor to detect, and it carried out heat welding of cutting and the both ends for the thickness sheet of 150 micrometers of polyethylene terephthalate (PET) at the predetermined size, and they were used for it as an endless belt.

[0022] In addition, although not used in this example, polyvinylidene fluoride (PVDF), polyester film, a polycarbonate film, etc. can be used.

[0023] As stated above, drawing 3 is the typical block diagram of conveyance belt opening which, 'twisted and drawing 2 looked at. [arrow head] Drawing 4 is other example typical block diagrams of opening. As shown in drawing 3 and 4, conveyance belt opening 6' is formed so that direct actuation may have possible wiper-blade 7a and capping unit 7b which have cleaning/maintenance function of each recording head unit regurgitation side of the recording head section 1 to the conveyance belt 6 of the shape of endless [above]. The configuration of said opening 6' was formed from the relation between a conveyance belt circumference, roller member arrangement, and recording paper loading number of sheets so that it might be settled in allowance velocity turbulence as an image formation possible field also as that of the conveyance location detection by the conveyance position sensors 17a and 17b, while it satisfied the range of the recording head section 1. the opening configuration of the rectangle of the need min in this example -- carrying out -- a opening 6 -- ' -- reinforcement was prepared in the **** element with a conveyance belt edge. It reinforced with the form where another reinforcement member 8a is stuck in the example of drawing 3 , and in other examples of drawing 4 , the conveyance belt circumference was made to agree, Kevlar fiber 8b has been arranged in the form where it passes through the both ends of a reinforcement part, and after wrapping in said Kevlar fiber 8b at the edge of the conveyance belt 6, fixing reinforcement was performed in heat joining. In this example, since meandering and deviation by the thickness nonuniformity of a reinforcement member occurred by preparing said reinforcement in the conveyance belt 6 at the time of revolution conveyance by the roller members 16a-16h, it formed so that one step of roller member of the range which contacts as a way method of evasion might be deleted.

[0024] drawing 2 -- the conveyance belt opening 6 -- ' -- it stops in the lower predetermined location of the recording head section 1, and is in the capping condition in which capping unit 7b carried out the pressure welding to the upper part from the service station section 7 in actuation and an each recording head unit 1A~1D regurgitation side.

[0025] Within said service station section 7, capping unit 7b and wiper-blade 7a are constituted independently possible [actuation] respectively. Each part material actuation is controlled by the control section which was prepared in this equipment and which is not illustrated, and is performed if needed. In this example, it roughly divides and there is the 3 following actuation.

[0026] (1) Flushing actuation : carry out the enforcement ink regurgitation of the foreign matter which carried out

adhesion deposition to an ink delivery, and clean it to it. (2) Capping actuation : cover a regurgitation side with the open air. It is actuation at the time of a halt. (3) Wiping actuation : carry out wiping of the foreign matter which carried out adhesion deposition to an ink delivery side in a wiper blade. The above (1) and (2) are actuation of capping unit 7b, and (3) is actuation by wiper-blade 7a. As this equipment, the actuation with most frequency is (1) Flushing actuation, and actuation is prepared for every predetermined count of the ink regurgitation by this example. Next, it becomes the time of image deterioration occurring, and (3) wiping actuation set up with directions of arbitration.

[0027] Capping unit 7b operates sequentially in an arrow head U and the direction of D at elevator guard by the cam which is not illustrated to the fixed recording head, and is held in the height in the 2 predetermined modes. The location held at the form pressurized with the spring with which the condition that the capping unit end face was held in the downward location was prepared in said regurgitation side in the location which carries out the socket of the regurgitation ink at the time of the Flushing actuation at capping unit 7b, and which is not illustrated turns into a location of capping actuation about 2mm from a recording head section regurgitation side. Said capping unit 7b is formed with silicon, acrylonitrile butane diene rubber, etc. by fitness with the ink used in this example.

[0028] Moreover, wiper-blade 7a is arranged in said service station 7 at capping unit 7b and parallel, and only when it is in the lowest point condition in rise-and-fall actuation of the aforementioned capping unit 7b, independent actuation of it is carried out.

[0029] The wiping actuation by wiper-blade 7a to a delivery side is held in the predetermined location as for which a wiper-blade end face carries out a pressure welding to a delivery side at elevator guard by the cam which does not illustrate each wiper blade through the both ends of the back up plate which is carrying out reinforcement immobilization to a package first.

[0030] At this time, said back up plate has a capping unit and the configuration in which it does not interfere in actuation of drawing 3 and the direction of arrow head L-R shown by 4, and carries out wiping of the whole body part of a regurgitation side in the direction of arrow head L-R according to the direct-acting device which is not illustrated while holding the condition of having carried out the pressure welding of the regurgitation side. A joint with a timing belt is prepared in the part where said direct-acting device of this example is not influenced for the elevator style in said cam of the wiper-blade back up plate, either, and actuation is performed by actuation of a timing belt.

[0031] Then, cleaning/maintenance actuation through the conveyance belt 6 in the ink jet recording device constituted as mentioned above is explained below. It is a flow chart until image formation of drawing 5 is carried out also to that of actuation of the conveyance belt 6 at the recording paper, and drawing 6 is a flow chart which shows the control procedure of the Flushing actuation of the recording head section through conveyance belt opening 6'. At drawing 6, although only the Flushing actuation was described, explanation is made by transposing the Flushing actuation in drawing to many aforementioned actuation also about capping and wiping actuation.

[0032] In drawing 5, if image formation actuation starts from the control section which is not illustrated, it will judge whether it is the field which the conveyance belt 6 carries out revolution actuation at step V1, and can convey the recording paper 20 at steps V2 and V3 also as that of the detection information on the conveyance position sensors 17a and 17b. In this example, the conveyance position sensors 17a and 17b have been arranged so that reinforcement member 8a and the distinction mark 18 may be detected, as shown in drawing 3 and 4, diverted the protection-from-light nature of reinforcement member 8a in the example of drawing 3, and considered as identification marking, and the black printing portion possessing the protection-from-light nature set up near the opening of a conveyance belt in other examples of drawing 4 was carried out as the distinction mark 18.

[0033] Discernment of a recording paper conveyance field detects the distinction mark 18 prepared near the opening of the conveyance belt 16 conveyed in the direction of arrow head F by conveyance position-sensor 17a, and carries out empty conveyance of between the predetermined migration after detection as a recording paper conveyance improper field (opening is under this field). Predetermined conveyance converts / counts at a travel the driving pulse of the pulse motor which is a drive motor of driving roller member 16a. It was the distance to which the aforementioned empty conveyance field added predetermined distance among roller member 16a - 16b at this example, and at the time of recording paper conveyance which performs image formation, the evaluation decision was carried out as a distance which does not contribute to an image as velocity turbulence, and it considered as the re-detected location of back end distinction mark 18' in conveyance position-sensor 17b with this equipment. Therefore, the number of sheets which can carry out continuation loading of the recording paper 20 is beforehand determined by the conveyance belt 6 by relation with the circumference of the conveyance belt 6, and supervisory control of the loading arrangement of the recording paper 20 is carried out to it. (It is possible for loading number of sheets to increase because the number of sheets which can carry out loading conveyance continuously in this example lengthens the conveyance belt circumference which is three sheets.)

If it comes between the conveyance belts which can be conveyed at step V4, the recording paper 20 is sent in in the direction of arrow head F on conveyance and the conveyance belt 6 from the feed unit 10, adsorption maintenance will be carried out also to that of electrification processing of step V5 in the form which synchronizes with it at the conveyance belt 6, and image formation in step V6 will be performed. A series of the aforementioned configuration actuation of each is performed continuously, without halting, and the recording paper 20 is integrating from the recording paper bearer rate in the conveyance way 11, and the bearer rate of the conveyance belt 6, and is arranged in the predetermined location on the conveyance belt 6. Exfoliation with an electric discharge machine is performed at step V7, and the recording paper 20 is conveyed by degree stroke.

[0034] In the above-mentioned image formation condition, if the Flushing actuation is directed from a control section, Flushing actuation will be performed. Actuation in a line crack and 1 image formation is not performed because the Flushing control in this example arrives at the range of the number of predetermined ink regurgitation required in assessment, but by management by the control section, it is 1 image unit and is surely carried out before and after formation of 1 screen image. (At this example, this actuation is once prepared at a rate every about 100 sheets with the image of average A4 size)

in drawing 6, if the Flushing actuation starts, the conveyance belt 6 will convey at step W1 -- having -- step W2 -- setting -- conveyance position-sensor 17a -- the conveyance belt opening 6 -- ' -- after detecting, predetermined distance conveyance is carried out and it stops so that a opening may come the conveyance belt 6 directly under the recording head section 1 by step W3. At step W4, each capping unit 7b corresponding to each recording head units 1A-1D goes up in a predetermined height location, and is stopped / held. In step W5, energization is performed on the line arm head in each recording head unit 1A-1D at electric-machine sensing element, and the regurgitation of the count of predetermined is performed for ink at intervals of predetermined from all ink deliveries. Each capping unit 7b descends at step W6 after the Flushing actuation, and it is contained by the original receipt condition. Next, at step W7, the judgment of where [of the recording paper loading condition on a conveyance belt] the aforementioned Flushing actuation was set up is performed. Since, as for the aforementioned judgment information, the conveyance hysteresis information on the recording paper 20 from the feed section 10 is managed in the control section, a judgment here serves as a distribution activity of the following conveyance belt 6 of operation. When two or more recording papers 20 are arranged and conveyed on the conveyance belts in the middle of sequential-image formation etc., in order [in step W8] to carry out image formation, the conveyance belt 6 is conveyed in a predetermined location. Moreover, when a conveyance belt is moved to the recording paper conveyance condition in step W9, and it is held in the state of weighting, when other recording papers 20 cannot be found on a conveyance belt, and there are directions of degree record, actuation of the image formation in said drawing 5 is performed.

[0035] Especially in the operation gestalt of this invention mentioned above, the effect which was excellent in the ink jet recording device using a full multi-type line recording head is brought about.

[0036]

[Effect of the Invention] According to the ink jet recording device of said this invention, the following effects are done so.

- (1) Since it becomes unnecessary to move each unit greatly according to the ink jet recording device of claim 1 whenever it performs cleaning actuation of the recording head unit ink regurgitation side of a under [image formation] by preparing opening on the conveyance means of the recording paper, the image quality formation effectiveness as equipment improves, and improvement in the speed of image formation can be attained.
- (2) Since it becomes that it is possible to also exclude the time set-ring field at the time of positive inversion actuation of the structure which according to the ink-jet recording device of claim 4 constitutes a conveyance belt since cleaning / maintenance actuation which the conveyance belt moved the conveyance belt to the predetermined location by conveyance operation of an one direction, and minded the opening can be performed which becomes useless, the image-quality formation effectiveness as equipment improves further, and improvement in the speed of image formation can do.

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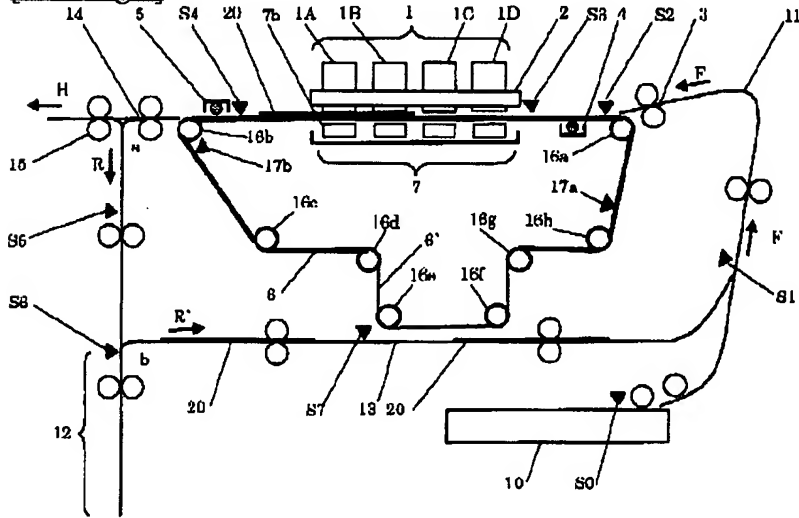
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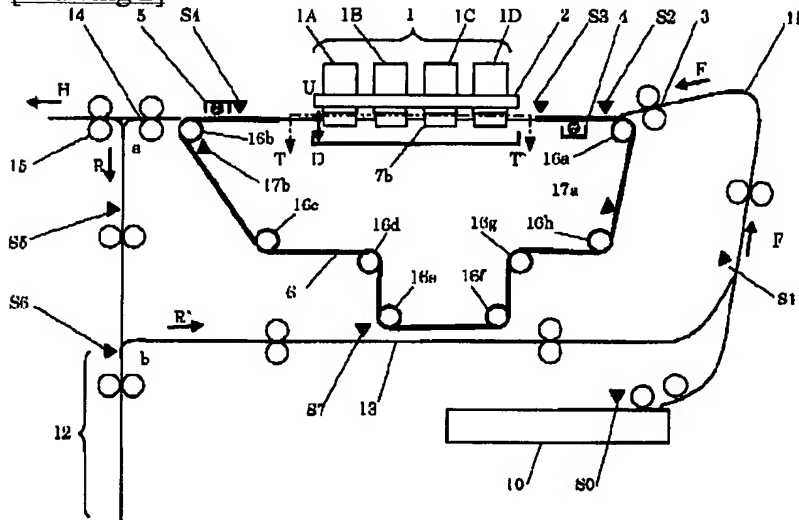
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DRAWINGS

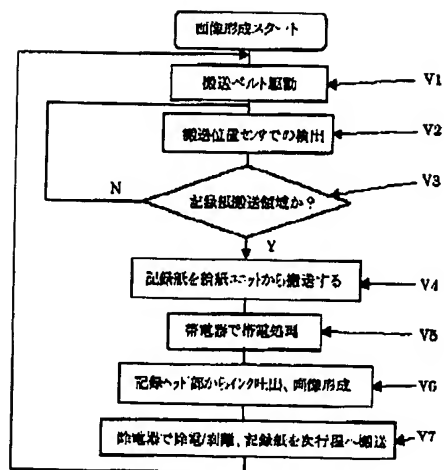
[Drawing 1]



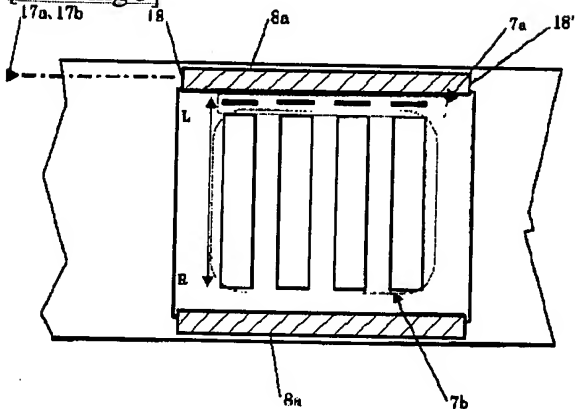
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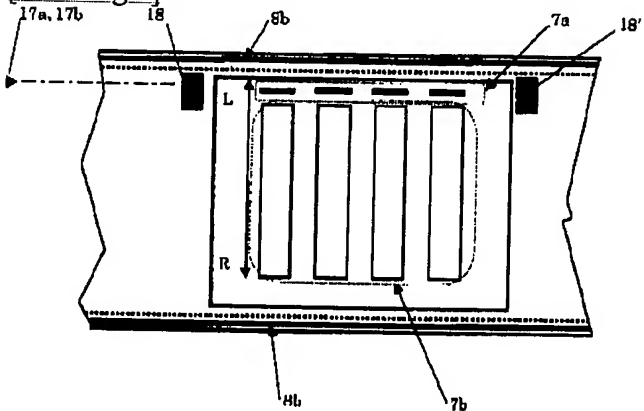
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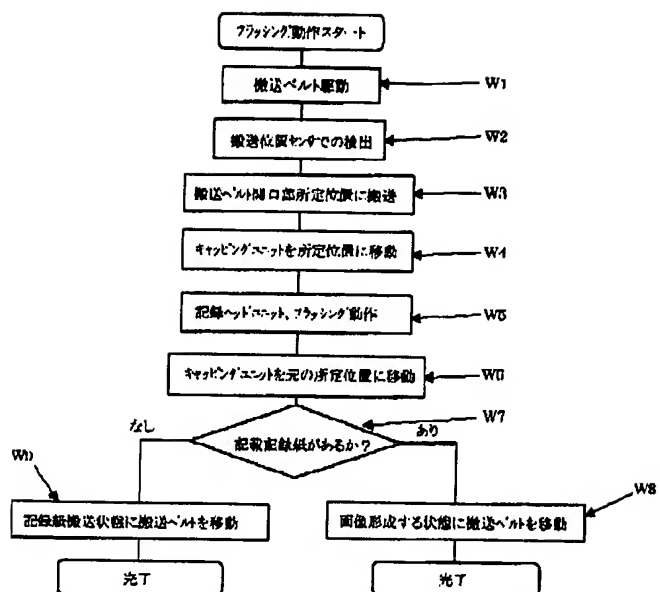
[Drawing 3]



[Drawing 4]



[Drawing 6]



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